SECURE SEAL SYSTEM (S^3) FOR CENTRAL VACUUM

Field of the Invention

The present invention relates generally to a central vacuum cleaner system, and more particularly, to a system and method for sealing a lower bucket container to a central vacuum cleaner.

Background of the Invention

Vacuum cleaners are employed to remove debris within a house or other building and generally include a flexible hose with a distal inlet end and a proximal outlet end, a vacuum source to draw air through the hose, and a debris collector interposed between the hose and the vacuum source to collect debris carried in the air exiting from the hose outlet end. Vacuum cleaners have historically been of two designs. Portable vacuum cleaners are designed to be carried or rolled about the area to be vacuumed, and usually include a bag or canister designed to be removably attached to the outlet end of a conduit that is in communication with a flexible hose or other debris collection device. Stationary or central vacuum cleaners generally include a vacuum source and debris collector installed in a remote location within the building, with conduits extending from the remote location to various areas requiring vacuuming. When utilized, a flexible hose is coupled to one of the inlets and the vacuum source to draw air and any collected debris through the flexible hose and conduit. The air is then conveyed through a debris receptacle for removal of debris before the air is discharged to the exterior.

The central vacuum cleaner systems include a debris receptacle, or bucket, coupled to an upper cylinder or canister. The debris receptacle has a generally cylindrically-shaped side wall and a bottom wall at the bottom of the side wall which together form a hollow interior space having an open upper end and a closed lower end. The open upper end of the debris receptacle is removably attached to an open bottom end of the canister by means such as the illustrated quick- release clips to close the open bottom end of the canister. A gasket rests in a groove formed in the exterior surface of the canister sidewall to obtain a substantially air-tight seal between the canister and the debris receptacle.

When power is supplied to the vacuum, suction created by the vacuum causes a flow

of air, which is exhausted from a vacuum motor through a vacuum-exhaust pipe of the vacuum motor to an external space surrounding the canister. Dirt, dust and other debris entrained within the flow of air is blocked by the collection bag and settles into the receptacle. When the receptacle is full of debris, the snap clips are opened and the receptacle is removed from the canister so that the receptacle can be emptied.

Summary of the Invention

The following presents a simplified summary of the invention in order to provide a basic understanding of some aspects of the invention. This summary is not an extensive overview of the invention. It is intended to neither identify key or critical elements of the invention nor delineate the scope of the invention. Its sole purpose is to present some concepts of the invention in a simplified form as a prelude to the more detailed description that is presented later.

A locking mechanism is provided for sealing a debris receptacle to a canister of a central vacuum system. The locking mechanism utilizes a latch in combination with a vertical gasket to provide a secure seal between the debris receptacle and the canister. The latch is coupled to the canister via screws, rivets, welds, or the like. The latch seals the debris receptacle to the canister by latching onto a handle portion of the receptacle. By twisting the debris receptacle with an edge of the handle into the latch, the latch catches the receptacle and compresses the handle toward the canister, thereby providing a tight seal.

According to one aspect of the present invention, a locking mechanism for a central vacuum system is provided. The locking mechanism includes a twist-lock latch configured to receive a handle portion of a debris receptacle. The locking mechanism also includes a vertical gasket employed to facilitate an air-tight seal between the debris receptacle and a canister of the central vacuum system.

According to another aspect of the present invention, a twist-lock latch for use in a locking mechanism of a central vacuum system is provided. The twist-lock latch includes a first shelf portion to provide a resting area for the debris receptacle when the debris receptacle is locked into place; and a stop indent that facilitates proper engagement of the debris receptacle.

In accordance with yet another aspect of the present invention, a vertical gasket

employed with a locking mechanism for a central vacuum system is provided. The vertical gasket includes a vertical sealing area to provide an increased surface sealing area for the locking mechanism. The vertical gasket also includes a bead roll formed in the gasket that corresponds with a bead roll groove formed in a canister portion of the central vacuum system.

In accordance with another aspect of the present invention, a locking mechanism for a central vacuum system is provided. The locking mechanism includes at least one twist-lock latch coupled to a canister; and a vertical gasket coupled to the canister.

According to yet another aspect of the present invention, a locking mechanism for a central vacuum system is provided. The locking mechanism includes latching means for securing a debris receptacle to a canister; and sealing means for facilitating an air-tight seal between the debris receptacle and the canister.

To the accomplishment of the foregoing and related ends, the invention then, comprises the features hereinafter fully described and particularly pointed out in the claims. The following description and the annexed drawings set forth in detail certain illustrative aspects of the invention. These aspects are indicative, however, of but a few of the various ways in which the principles of the invention may be employed and the present invention is intended to include all such aspects and their equivalents. Other object, advantages and novel features of the invention will become apparent from the following detailed description of the invention when considered in conjunction with the drawings.

Brief Description of the Drawings

Fig. 1 illustrates a front view of a central vacuum system.

Fig. 2 illustrates an exploded view of the central vacuum system shown in Fig. 1.

Fig. 3 illustrates a front perspective view of a locking mechanism in accordance with an aspect of the present invention.

Fig. 4 illustrates a side perspective view of a locking mechanism in accordance with an aspect of the present invention.

Fig. 5 illustrates a perspective view of a canister for a central vacuum system having two locking mechanisms coupled thereto in accordance with an aspect of the present invention.

Fig. 6 illustrates a top perspective view of a debris receptacle for a central vacuum system.

Fig. 7 illustrates a debris receptacle coupled to a canister via a locking mechanism in accordance with an aspect of the present invention.

Fig. 8 illustrates a debris receptacle coupled to a canister via a locking mechanism in accordance with an aspect of the present invention.

Detailed Description of the Invention

The present invention provides a locking mechanism which facilitates a secure seal between a lower bucket, or debris receptacle, and a canister of a central vacuum system. The locking mechanism includes a twist-lock latch and vertical gasket combination located on a bottom portion of the canister. The present invention will now be described with reference to the drawings, wherein like reference numerals are used to refer to like elements throughout. In the following description, for purposes of explanation, numerous specific details are set forth in order to provide a thorough understanding of the present invention. It may be evident, however, that the present invention may be practiced without these specific details.

Referring initially to Figs. 1 and 2, a central vacuum system 100 is illustrated. The central vacuum system 100 includes an upper cylinder or canister 105, a filter or collection bag 110, a lower bucket or debris receptacle 115, an upper plate or lid 120, a canopy 125, and a vacuum motor assembly 130.

The canister 105 has a generally cylindrically-shaped side wall 135 which forms a hollow interior space having open upper and lower ends. The canister 105 can be rolled from steel or other suitable materials. The side wall 135 is provided with a pair of vacuum-intake ports 140, 145 each located near the bottom of the side wall 135. A vacuum-exhaust opening 150 and a cooling-air outlet 155 are each located near the top of the canister 105. The cooling-air outlet 155 is preferably a plurality of parallel and spaced-apart slots. The canister 105 is also provided with suitable openings for an on-off switch 160 and a power cord 165 each near the top of the side wall 135. The on-off switch 160 is attached to the side wall 135 and is operatively connected to an electrical control board (not shown) located within the canister 105. The power cord 165 extends through the side wall 135 and is operatively

connected to the electrical control board so that the central vacuum system 100 can be connected to a conventional electrical power source (not shown).

The collection bag 110 is housed within the hollow interior space of the canister 105. The collection bag 110 has an opening provided with a flexible ring or rim 170. The flexible rim 170 rests within a first groove 175 formed in the interior surface of the side wall 135 of the canister 105. The flexible rim 170 secures the collection bag 110 to the side wall 135 and generally seals the collection bag 110 to the side wall 135 so that air passing through the canister 105 must pass through the collection bag 110. The collection bag 110 includes an air permeable material which substantially prevents dirt and dust from passing therethrough.

The debris receptacle 115 has a generally cylindrically-shaped side wall and a bottom wall at the bottom of the side wall which together form a hollow interior space having an open upper end and a closed lower end. The debris receptacle 115 can be molded plastic or any other suitable material. The open end of the debris receptacle 115 is removably attached to the open bottom end of the canister 105 by a twist-lock latch 180, as will be described in further detail herein, to close the open bottom end of the canister 105. A vertical gasket 185 rests in a second groove 190 formed in the exterior surface of the canister sidewall 135 to facilitate a substantially air-tight seal between the canister 105 and the debris receptacle 115.

The upper lid 120 is sized and shaped to generally close the open top end of the canister 105. The upper lid 120 is provided with a central inlet or opening 195 for cooling air. The upper lid 120 can be formed from steel or any other suitable material. The upper lid 120 is removable secured to the top of the canister side wall 135 by removable fasteners 200 such as, for example, screws.

The canopy 125 is coupled to the top of the central vacuum system 100 and generally encloses the central opening 195 in the upper lid 120. The canopy 125 can be molded of a plastic material such as, for example, an ABS plastic. A plurality of cooling-air inlets 205 are provided in a dome portion of the canopy 125. The inlets 205 are preferably a plurality of parallel and spaced-apart slots. The inlets 205 are positioned so that there is generally not a direct pathway from the central opening 195 of the upper lid 120 to the inlets 205 of the canopy 125 to reduce noise emitted from the central vacuum system 100 through the central opening 195. The canopy 125 is secured to the top of the canister side wall 135 by the same fasteners 200 which secure the upper lid 120. Alternatively, separate fasteners can be used

or the canopy 125 can be integral with the upper lid 120.

Fig. 3 illustrates an example of a locking mechanism 300 for the central vacuum system 100 in accordance with an aspect of the present invention. The locking mechanism 300 includes twist-lock latch 180 and vertical gasket 185. The twist-lock latch 180 comprises a contoured ramp 310, which is operable to guide the debris receptacle 115 into place. The contoured ramp 310 facilitates vertical alignment of the debris receptacle 115 and thus provides for easy engagement and disengagement. The twist-lock latch 180 also includes a secure landing area 320 for a handle of the debris receptacle 115 and a stop detent 330 that allows a user to confirm full engagement of the debris receptacle into a lock position. Because the twist-lock latch 180 does not include moving parts, the latch 180 will not loosen or degrade over a lifetime of the central vacuum system. The twist-lock latch 180 is preferably manufactured from a material, such as 14 gage galvanized steel, to mitigate corrosion. The twist-lock latch 180 is secured to a canister 105 of the central vacuum system 100 via a bolt, pin, screw, or any other suitable fastener 340.

The vertical gasket 185 comprises a vertical sealing area, which provides an increased surface sealing area for the locking mechanism 300 as compared to conventional designs. A plurality of horizontal ribs 350 are located around the periphery of the gasket 185 to facilitate reduced friction and drag during engagement and disengagement of the locking mechanism. The vertical gasket 185 also includes a bead roll 360 formed in the gasket 185 (e.g., in an end portion of the gasket). The diameter of the bead roll 360 corresponds with a groove (not shown) formed in an exterior surface of the canister 105. When the bead roll 360 is fit into the groove, the vertical gasket 185 is held firmly in place with respect to the canister 105. In contrast, conventional central vacuum systems employ adhesives to hold a sealing gasket in place. Such adhesives have shown to not hold up over a lifetime of the central vacuum system. Any suitable material can be utilized to manufacture the vertical gasket 185; however, superior synthetic rubber is preferred in order to provide lifetime durability of the gasket. Accordingly, customer and/or dealer maintenance are substantially reduced or mitigated.

Fig. 4 illustrates a side perspective view of the locking mechanism 300 described with respect to Fig. 3. The twist-lock latch 180 has first shelf portion 410, in which the handle of the debris receptacle 115 is located when locked into place, and a second shelf portion 420,

which provides a clearance area for the bead roll 360 of the vertical gasket 185. The distance between the first shelf portion 410 and the secure landing area 320 corresponds with a thickness of the debris receptacle handle. In accordance with one aspect of the present invention, the locking mechanism 300 can include two twist lock latches 180 located on opposing sides of the central vacuum canister 105, as depicted in Fig. 5. Accordingly, the two twist lock latches 180 align with the debris receptacle 115 and engage substantially simultaneously. It is to be appreciated that the any number of twist lock latches can be employed with the central vacuum system 100 and still be contemplated as falling within the scope of the present invention.

Fig. 6 depicts a handle 600 of debris receptacle 115. The handle 600 includes a notch 620 at a center portion, which is located between end portions 610. The debris receptacle 115 is coupled to central vacuum canister 105 by introducing one of the handle end portions 610 of the into a wide end portion of a twist-lock latch located on the canister 105. The debris receptacle 115 is twisted until the inserted end portion 610 reaches the stop detent 330 on the twist-lock latch 180.

Turning now to Figs. 7 and 8, the canister 105 and debris receptacle 115 of the central vacuum system 100 coupled with locking mechanism 300 is illustrated. The twist-lock latch 180 substantially seals the debris receptacle 115 to the canister 105 by latching onto a handle portion 600 of the debris receptacle 115. By twisting the debris receptacle 115 with an edge of the handle portion 600 into a wide end of the latch 180, the latch 180 catches the debris receptacle 115 against a seal (not shown) on the canister 105. When a conventional debris receptacle is employed, only one of the handle end portions is contained by the twist-lock latch. Thus, conventional debris receptacles can be utilized with the twist-lock latch without modification.

Several advantages are realized with the locking mechanism of the present invention. For example, a travel distance of the latch in order to provide a suitable seal engagement is substantially shorter than conventional designs. Accordingly, the present invention facilitates a faster, easier, and more efficient assembly due to the short travel distance. As another example, a customer is not required to push as far against latch friction for as long a period of time as past designs. As compared to one conventional design, the travel distance of the present invention is decreased from about six inches to about two inches. Moreover, the

locking mechanism is readily visible to the customer, which facilitates quick fastening for the customer in an ergonomically friendly fashion. The design aesthetics of the locking mechanism are superior as compared to conventional clip devices, which makes for a more attractive product. Moreover, employing the clip devices results in wear on a painted surface of the central vacuum system whereas, the present locking mechanism does not contact the painted surface.

Although a detailed description of a preferred embodiment of this invention has been shown and described hereinabove, it will be understood that various modifications and rearrangements of the parts and their respective features may be resorted to without departing from the scope of the invention as disclosed and claimed herein.